

Claims

- [1] A remotely controlled apparatus for recovering liquid from a sunken ship (500) comprising an underwater recovery device (100) operated underwater, a remotely operated vehicle (200) for moving the underwater recovery device (100) to the sunken ship (500), a remote controller (300) for remotely controlling the underwater recovery device (100) and the remotely operated vehicle (200), a base plate (80) for fixing and separating the underwater recovery device (100) to and from the sunken ship (500), and a transporting hose (71) for transporting the liquid contaminant to the surface, the remotely controlled apparatus comprising: the underwater recovery device (100) including:
a supporting plate (10') and a supporting frame (10), to which a plurality of devices including a linkage (111), with which the underwater recovery device (100) is coupled, are fixed;
a plurality of chucking devices (20) for fixing the underwater recovery device (100) to the sunken ship (500);
a grabber (30) for attaching and detaching the base plate (80) to the supporting frame (10);
a plurality of DTB systems 40 for fixedly attaching the base plate (80) to the sunken ship (500);
a plurality of thrusters (50), associated with the DTB systems (40), for providing a propulsive force so as to closely attach and detach the supporting frame (10) to and from the sunken ship (500);
a hole cutter (60) for drilling a hole with a desired diameter for the recovery of the liquid in the sunken ship (500); and
a liquid recovery device (70) integrally formed with the hole cutter (60) and having a pump for recovering the liquid through the hole drilled in the sunken ship (500).
- [2] The remotely controlled apparatus as set forth in claim 1, wherein the grabber (30) comprises a plurality of coupling protrusions (32) protruded from a leading end of a body (31) that is connected to a cylinder (33) such that the coupling protrusions (32) are spread in the radial direction by the cylinder (33) to fix the base plate (80).
- [3] The remotely controlled apparatus as set forth in claim 1, wherein the thruster (50) comprises:
a main thruster (50a), installed in the same direction as the DTB system (40), for generating a propulsive force for moving the underwater recovery device (100) in the direction perpendicular to the sunken ship (500); and

an auxiliary thruster (50b), installed perpendicular to the main thruster (50a), for generating a propulsive force for moving the underwater recovery device (100) parallel to the sunken ship (500) (in the right and left directions).

[4] The remotely controlled apparatus as set forth in claim 1, wherein the main thruster (50a) and the auxiliary thruster (50b) are simultaneously operated to move the underwater recovery device (100) in the diagonal direction.

[5] The remotely controlled apparatus as set forth in claim 1, wherein the liquid recovery device (70) is disposed in a housing to be adjacent to the hole cutter (60) and is integrally formed with the hole cutter (60).

[6] The remotely controlled apparatus as set forth in claim 1, further comprising a warm water-supplying device for supplying high-temperature-and-high-pressure liquid from the assisting ship.

[7] A method for recovering the liquid in a sunken ship comprising:
 a preparation step (S1) for analyzing and inspecting the determination of the validity of recovering the liquid in the tank of the sunken ship and the characteristics of the sea area where the ship is sunken, including the sub-steps of:
 precisely analyzing and inspecting information about sea accident and the sunken ship to estimate the possibility that the liquid contaminant such as oil remains in the sunken ship and the risk of the liquid contaminant;
 searching the sunken ship using a marine searching device such as a site scan sonar;
 precisely inspecting the sunken ship by divers or using a diving ship and examining the validity of recovering the liquid; and
 establishing a plan for recovering the liquid;
 an attaching step (S2) for attaching a seawater introducing base plate (80b) to the sunken ship (500), including the sub-steps of:
 installing a navigation device and anchoring the assisting ship on the water above the place of the sunken ship (500);
 precisely inspecting the sunken ship (searching and selecting a position of the sunken ship to be drilled) and removing obstacles around the sunken ship (500);
 cleaning the peripherals of the drilling position and marking the drilling position;
 moving the underwater recovery device (100) attached with the seawater introducing base plate (80b) to the seawater introducing position (the drilling position);
 attaching the seawater introducing base plate (80b) to the sunken ship (500) using DTB systems (40) and drilling the sunken ship (500) using a hole cutter (60); and
 closing assembly holes (812) using a shutter (86) of the seawater introducing

base plate (80b) by driving a cylinder (87) and separating the underwater recovery device (100) from the sunken ship (500) to which the seawater introducing base plate 80b is attached;

a recovery step (S3) for recovering the liquid including the sub-steps of:

mounting a liquid recovery base plate (80a) to the underwater recovery device (100) by raising the underwater recovery device (100) to the water surface;

moving the underwater recovery device (100) to the liquid recovery position (the drilling position) in the same fashion;

attaching the liquid recovery base plate (80a) to the sunken ship (500) and drilling a hole using the hole cutter (60); and

fixedly connecting the liquid recovery device (70) and a hose (71) for recovering the liquid to the liquid recovery base plate (80a) attached to the sunken ship

(500) and the underwater recovery device (100) and recovering and transporting the liquid from the tank of the sunken ship (500) to an assisting ship (600); and

a finishing step (S4) including the sub-steps of:

closing an assembly hole (812) of the liquid recovery base plate (80a) when the recovery of the liquid is completed;

separating the underwater recovery device (100) from the liquid recovery base plate (80a) to separate the underwater recovery device (100) from the sunken ship (500); and

leaving the base plates (80a and 80b) on the sunken ship (500) and surfacing the underwater recovery device (100) and the remotely operated vehicle (200).